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CLAIMS

1. A system for treating a complex fluid, comprising:

a) a non-laser light source for generating and transmitting substantially monochromatic light;

b) a light emitting surface positioned relative to said non-laser light source such that at least a portion of said monochromatic light generated by said non-laser light source is transmitted therethrough;

c) a complex fluid positioned proximate to said light emitting surface, said complex fluid including at least one component that is sensitive to a change in temperature; and

d) a cooling fluid in thermal communication with said light emitting surface, said cooling fluid being effective to prevent said complex fluid from undergoing a temperature change damaging to said sensitive component.

2. A system according to claim 1, wherein said complex fluid includes first and second fluid components that are responsive to light energy, and wherein said substantially monochromatic light is effective to substantially preserve said first fluid component and to substantially excite said second fluid component.

3. A system according to claim 1, wherein said complex fluid is selected from the group consisting of blood products, pharmaceuticals, injectable solutions and vaccines.

4. A system according to claim 1, wherein said substantially monochromatic light has a wavelength of between 260 nm and 310 nm.

5. A system according to claim 1, wherein said non-laser light source includes an excimer gas selected from the group consisting of XeI, Cl_2, XeBr, Br_2, XeCl, filtered XeBr, I_2 and XeF.

6. A system according to claim 1, wherein said light emitting surface is fabricated from a material selected from group consisting of quartz, Teflon and combinations thereof.

7. A system according to claim 1, wherein said complex fluid includes a photoactive compound selected from a class of photoactive compounds that includes psoralens, 8-MOP, merocyanine 540, riboflavin, methylene blue, phthalocyanines, and combinations thereof.

8. A system according to claim 1, wherein said cooling fluid is water.

9. A system according to claim 1, wherein said non-laser light source is positioned within a housing and said cooling fluid flows through said housing between said non-laser light source and said light emitting surface.

10. A non-laser light source, comprising:

a) a housing defined by at least one outer wall; and

b) a bounded volume of photon-producing gas mounted within said housing;

wherein at least a portion of said outer wall is substantially transparent to photons produced by said bounded volume of gas, said substantially transparent portion of said outer wall being temperature-controlled.

11. A non-laser light source according to claim 10, wherein said bounded volume of photon-producing gas generates substantially monochromatic light having a wavelength of between 260 nm and 310 nm.

12. A non-laser light source according to claim 10, wherein photon-producing gas is an excimer gas selected from the group consisting of XeI, Cl_2, XeBr, Br_2, XeCl, filtered XeBr, I_2 and XeF.

13. A non-laser light source according to claim 10, wherein said substantially transparent portion of said outer wall is fabricated from quartz.

14. A non-laser light source according to claim 10, wherein said substantially transparent portion of said outer wall is temperature-controlled by a cooling fluid that flows adjacent thereto.

15. A non-laser light source according to claim 10, wherein a treatment fluid is positioned adjacent said substantially transparent portion of said outer wall, said treatment fluid being selected from the group consisting of blood products, pharmaceuticals, injectable solutions and vaccines.

16. A system for treating complex fluids, comprising:

a) a bounded volume of photon-producing gas for generating monochromatic light, said bounded volume positioned within a fluid-tight housing that includes at least one light emitting surface having a light emitting surface geometry; and

b) a treatment surface having a treatment surface geometry positioned for irradiation by said monochromatic light emitted from said housing;

wherein said light emitting surface geometry substantially corresponds to said treatment surface geometry.

17. A system according to claim 16, wherein said photon-producing gas is an excimer gas selected from the group consisting of XeI, Cl_2, XeBr, Br_2, XeCl, filtered XeBr, I_2 and XeF.

18. A system according to claim 16, wherein said light emitting surface geometry and said treatment surface geometry are selected from the group consisting of planar geometries, annular geometries, cylindrical geometries, elliptical geometries, non-symmetrical geometries, and combinations thereof.

19. A system according to claim 16, further comprising a quartz plate mounted to said fluid-tight housing, said quartz plate having inwardly and outwardly directed faces, and wherein said inwardly directed face of said quartz plate is said light emitting surface and said outwardly directed face of said quartz plate is said treatment surface.

20. A system according to claim 16, wherein a complex fluid is positioned adjacent said treatment surface for irradiation by said monochromatic light emitted from said housing.

21. A system according to claim 16, wherein said complex fluid is contained within a body or limb, and said treatment surface constitutes a surface of said body or limb.

22. A method for treating a complex fluid, comprising:

a) introducing a supply of complex fluid into a treatment zone, said complex fluid including first and second fluid components that are responsive to light energy;

b) applying light energy to said complex fluid in said treatment zone, said light energy being supplied from an excimer-based non-laser light source that generates a substantially monochromatic light having a designated wavelength of between 260 nm and 310 nm;

wherein said light energy from said excimer-based non-laser light source is effective to substantially preserve said first fluid component and to substantially excite said second fluid component.

23. A method according to claim 22, wherein said complex fluid is selected from the group consisting of blood products, pharmaceuticals, injectable solutions and vaccines.

24. A method according to claim 22, further comprising adding a photoactive compound to said complex fluid prior to applying said monochromatic light thereto.

25. A method according to claim 22, wherein said excimer-based non-laser light source includes a system for controlling temperature of said complex fluid throughout application of said monochromatic light thereto.

26. A method according to claim 22, wherein said excimer-based non-laser light source generates said monochromatic light utilizing an excimer gas selected from the group consisting of XeI, Cl_2, XeBr, Br_2, XeCl, filtered XeBr, I_2 and XeF.

27. A method according to claim 22, wherein said complex fluid treatment involves leukocyte reduction and said first fluid component is a carrier fluid.

28. A method according to claim 22, wherein said complex fluid treatment involves inactivation of organisms by disrupting one or more nucleic acids.

29. A method according to claim 22, wherein said complex fluid is a blood product selected from the group consisting of whole blood, plasma, platelets, packed red cells and combinations thereof.

30. A method according to claim 22, wherein said complex fluid treatment involves generation of specific chemical adducts to a photoactive agent, and said first fluid component is a different set of chemical adducts to said photoactive agent.

31. A method according to claim 22, wherein said complex fluid treatment involves chemical synthesis wherein said first fluid component produces a higher yield of a desired chemical compound and said second fluid component reduces yield of said desired chemical compound

32. A method according to claim 22, further comprising mixing said complex fluid during treatment thereof.